Row Operations

Types of systems:

2D $\mathbb{R}^2$::

- Non-parallel lines
- Identical lines
- Parallel lines

3D $\mathbb{R}^3$:

- Unique solution
- Infinite number of solutions
- No solutions

Row operations:

- (Replacement/ Addition) Add a multiple of one row to another.
- (Interchange) Interchange two rows.
- (Scaling) Multiply a row by a non-zero scalar.

$$\begin{cases} x_1 - 2x_2 + x_3 = 0 \\ 2x_2 - 8x_3 = 8 \\ 5x_1 - 5x_3 = 10 \end{cases}$$

Row_1 +Row_2

$$\begin{cases} x_1 - 7x_3 = 8 \\ 2x_2 - 8x_3 = 8 \\ 5x_1 - 5x_3 = 10 \end{cases}$$

Row_2 /2

$$ \begin{equation} \begin{cases} x_1-7x_3=8\\ x_2-4x_3=4\\ 5x_1-5x_3=10 \end{cases} \end{equation} $$

Row_3 - 5 Row_1

$$ \begin{equation} \begin{cases} x_1-7x_3=8\\ x_2-4x_3=4\\ 10x_2-10x_3=10 \end{cases} \end{equation} $$ **Note: Row_1 represents the original Row_1 not the modified Row_1

$\text{Row}_3 - 10\ \text{Row}_2$

$$ \begin{equation} \begin{cases} x_1-7x_3=8\\ x_2-4x_3=4\\ 30x_3=-30 \end{cases} \end{equation} $$ $$x_3=-1$$

Substiution

$$ x_1=1 $$ $$ x_2=0 $$